

disease, collecting true natural history data in large cohorts becomes challenging. Placebo groups provide short-term control history, but in a chronic disease characterised by a decline over decades, tolerability and effect of interventions will need assessment over a timeframe extending the feasibility of clinical trials. Additionally, the investigators provide a major contribution to future clinical research and therapy development in Duchenne muscular dystrophy by providing a novel framework to assess disease progression. These clinically important, disease-related, validated milestones will be useful as clinical endpoints in registration-oriented clinical trials, will enable extrapolation of therapeutic effect to other stages of the disease, and will facilitate standardised long-term investigations as required in post-marketing settings for new therapeutic compounds in Duchenne muscular dystrophy.

Finally, this study adds evidence of the long-term benefits of glucocorticoids and the effect on all causes of mortality—a very important message because these are fairly cheap and easily accessible drugs—for the benefit of all patients with Duchenne muscular dystrophy.

#### Nathalie Goemans

KU Leuven, University of Leuven, Faculty of Medicine, University Hospitals Leuven, Department of Child Neurology, Neuromuscular Reference Centre for Children, B-3000 Leuven, Belgium  
nathalie.goemans@uzleuven.be

I have received consultancy and advisory board fees from PTC Therapeutics, Biogen, BioMarin, Summit, Roche, Italfarmaco, and Bristol-Meyers Squibb.

- 1 Bushby K, Finkel R, Birnkrant DJ, et al. Diagnosis and management of Duchenne muscular dystrophy, part 1: diagnosis, and pharmacological and psychosocial management. *Lancet Neurol* 2010; **9**: 77–79.
- 2 Matthews E, Brassington R, Kuntzer T, Jichi F, Manzur AY. Corticosteroids for the treatment of Duchenne muscular dystrophy. *Cochrane Database Syst Rev* 2016; **5**: CD003725.
- 3 Griggs RC, Herr BE, Reha A, et al. Corticosteroids in Duchenne muscular dystrophy: major variations in practice. *Muscle Nerve* 2013; **48**: 27–31.
- 4 Schram G, Fournier A, Leduc H, et al. All-cause mortality and cardiovascular outcomes with prophylactic steroid therapy in Duchenne muscular dystrophy. *J Am Coll Cardiol* 2013; **61**: 948–54.
- 5 McDonald CM, Henricson EK, Abresch RT, et al. Long-term effects of glucocorticoids on function, quality of life, and survival in patients with Duchenne muscular dystrophy: a prospective cohort study. *Lancet* 2017; [http://dx.doi.org/10.1016/S0140-6736\(17\)32160-8](http://dx.doi.org/10.1016/S0140-6736(17)32160-8).
- 6 McDonald CM, Henricson EK, Abresch RT, et al. The Cooperative International Neuromuscular Research Group Duchenne Natural History Study—a longitudinal investigation in the era of glucocorticoid therapy: design of protocol and the methods used. *Muscle Nerve* 2013; **48**: 32–54.
- 7 Kieny P, Chollet S, Delalande P, et al. Evolution of life expectancy of patients with Duchenne muscular dystrophy at AFM Yolaine de Kepper centre between 1981 and 2011. *Ann Phys Rehabil Med* 2013; **56**: 443–54.
- 8 Duboc D, Meune C, Pierre B, et al. Perindopril preventive treatment on mortality in Duchenne muscular dystrophy: 10 years' follow-up. *Am Heart J* 2007; **154**: 596–602.
- 9 Pane M, Mazzone ES, Sivo S, et al. Long term natural history data in ambulant boys with Duchenne muscular dystrophy: 36-month changes. *PLoS One* 2014; **9**: e108205.
- 10 van den Bergen JC, Hiller M, Böhringer S, et al. Validation of genetic modifiers for Duchenne muscular dystrophy: a multicentre study assessing *SPP1* and *LTBP4* variants. *J Neurol Neurosurg Psychiatry* 2015; **86**: 1060–65.
- 11 Ricotti V, Ridout DA, Scott E, et al. Long-term benefits and adverse effects of intermittent versus daily glucocorticoids in boys with Duchenne muscular dystrophy. *J Neurol Neurosurg Psychiatry* 2013; **84**: 698–705.
- 12 Moxley RT, Pandya S, Ciafaloni E, Fox DJ, Campbell K. Change in natural history of Duchenne muscular dystrophy with long-term corticosteroid treatment: implications for management. *J Child Neurol* 2010; **25**: 1116–29.

## Pollution, health, and the planet: time for decisive action

For decades, pollution and its harmful effects on people's health, the environment, and the planet have been neglected both by governments and the international development community. Pollution is the largest environmental cause of disease and death in the world today, responsible for an estimated 9 million premature deaths in 2015.<sup>1</sup> 92% of all pollution-related mortality is seen in low-income and middle-income countries.<sup>1</sup> A new *Lancet* Commission on pollution and health aims to confront and overturn this urgent predicament.<sup>1</sup> The substantial health and economic costs of pollution globally can no longer be ignored.

The *Lancet* Commission on pollution and health is the product of a collaboration between *The Lancet*, the Global Alliance on Health and Pollution (GAHP), including independent researchers and policy makers, and the

Icahn School of Medicine at Mount Sinai, New York, USA. The report was led by Philip Landrigan, an environmental scientist and physician, and Richard Fuller, Founder and President of the non-governmental organisation Pure Earth and the secretariat of GAHP. The Commission's report focuses much-needed attention on the problem of pollution, especially industrial, vehicular, and chemical pollution, and provides actionable and cost-effective solutions to policy makers, while dispelling the myth that pollution is an inevitable consequence of economic development. The Commission identifies knowledge gaps and sets out a research agenda for future work.

As the report shows, no country is unaffected by pollution. Human activities, including industrialisation, urbanisation, and globalisation, are all drivers of pollution. Through analyses of existing and emerging



Published Online  
October 19, 2017  
[http://dx.doi.org/10.1016/S0140-6736\(17\)32588-6](http://dx.doi.org/10.1016/S0140-6736(17)32588-6)

This online publication has been corrected. The corrected version first appeared at [thelancet.com](http://thelancet.com) on April 10, 2018

See [The Lancet Commissions](#) page 462  
 For the [Global Alliance on Health and Pollution](#) see <http://www.gahp.net/>

data, the report examines the health effects and economic costs of multiple forms of pollution for the first time, including air (ambient and household), water, soil, and workplace. Additionally, the report presents troubling new data on the extent of chemical and pesticide pollution, including pollution by toxic chemicals at contaminated sites. The nature of pollution is changing, and is worsening in places. Many effects of chemical pollutants are yet to be determined but much is still known. The Commission estimates welfare losses due to pollution to be more than US\$4.6 trillion per year, which is equivalent to 6.2% of global economic output.<sup>1</sup>

The linkages between pollution, climate, and planetary health (the health of human civilisations and the natural systems on which they depend) are made throughout the Commission report. Pollution is a major theme within planetary health because the drivers of climate change, such as the combustion of fossil fuels or land use change, are also important contributors to pollution. Pollution itself has effects, which are still incompletely understood, on a range of natural systems—for example, toxic chemicals can cause reduced ecosystem function that can indirectly affect human health.<sup>2</sup>

In 2006, the Stern review commissioned by the UK Government was influential in reframing climate change as an economic issue, and not merely an environmental challenge.<sup>3</sup> The Stern review improved our understanding of the economic costs of climate change, and inspired a huge amount of subsequent work. We hope that the findings and recommendations from this *Lancet* Commission will also marshal action in the health and development sectors, and persuade leaders at the national, state, provincial, and city levels to make pollution a priority. Although there is some activity on pollution internationally, much more is needed. The *Lancet* Commission is launched in New York, USA, at a worrisome time, when the US Government's

Environmental Protection Agency, headed by Scott Pruitt, is undermining established environmental regulations. This year's annual UN Environment Assembly will convene in Nairobi, Kenya, on Dec 4–6, 2017. Ministers of Environment from member states, alongside civil society and the private sector, will be in attendance. For the first time, the overarching conference theme is "Towards a Pollution-Free Planet". Recommendations from this *Lancet* Commission are under consideration, and it is hoped that the outcomes will prioritise pollution from a health perspective.

This *Lancet* Commission should inform policy makers and serve as a timely call to action. Pollution is a winnable battle. In the latest results of the Global Burden of Disease, for example, the age-standardised death rates for all causes of air pollution were reported to have fallen by 23% between 2006 and 2016.<sup>4</sup> Now is the moment to accelerate our collective response. Current and future generations deserve a pollution-free world.

*Pamela Das, Richard Horton*  
*The Lancet*, London EC2Y 5AS, UK

We declare no competing interests. We would like to thank Philip Landrigan and Richard Fuller for their leadership of the *Lancet* Commission on pollution and health, and the Commissioners, independent researchers, and policy makers for their contributions to this report. We would like to thank USAID, US National Institute of Environmental Health Sciences, the European Commission, and the Governments of Germany, Norway, and Sweden for their funding of the report, input, or both.

- 1 Landrigan PJ, Fuller R, Acosta NJR, et al. The *Lancet* Commission on pollution and health. *Lancet* 2017, published online Oct 19. [http://dx.doi.org/10.1016/S0140-6736\(17\)32345-0](http://dx.doi.org/10.1016/S0140-6736(17)32345-0).
- 2 Whitmee S, Haines A, Beyrer C, et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–*Lancet* Commission on planetary health. *Lancet* 2015; **386**: 1973–2028.
- 3 Stern N. Stern review report on the economics of climate change. 2006. [http://www.wvf.se/source.php/1169157/Stern%20Report\\_Exec%20Summary.pdf](http://www.wvf.se/source.php/1169157/Stern%20Report_Exec%20Summary.pdf) (accessed Sept 29, 2017).
- 4 GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017; **390**: 1345–422.



## Towards a healthier and safer environment

The *Lancet* Commission on pollution and health by Philip Landrigan and colleagues<sup>1</sup> is an immensely important piece of work highlighting the impact that environmental pollution has on death and disease and the related need to scale up political will if we are to effectively confront this issue.

WHO has long recognised the important influence that environmental integrity has on human health and development. We know from WHO's most recent environmental burden of disease assessment that at least 12.6 million people die each year because of preventable environmental causes.<sup>2</sup> This is almost a

Published Online  
 October 19, 2017  
[http://dx.doi.org/10.1016/S0140-6736\(17\)32545-X](http://dx.doi.org/10.1016/S0140-6736(17)32545-X)  
 See [The Lancet Commissions](#) page 462